REMARKS

The present invention is concerned with preventing a fault in the switches

5   of a device from causing the transducers of the device from operating in a
hazardous manner. The new claims narrow the present invention to controls that
identify each of the scanned switches as functional or faulty before closing any
of the switches in the transducer circuit. This allows the present control to
prevent the last functioning switch from closing, mistakenly energizing the

10   transducer.

In the approach of Bartels one switch, K2, cannot be tested until the
switch, K1, is closed. If K2 in Bartels has shorted, Bartels admits his control
cannot detect this fault prior to closing K1. If K2 has shorted, when Bartels
closes K1 the transducer will be mistakenly energized and Bartels admits he

15   cannot prevent it. Bartels, in his Brief Description of the Invention p1 ln50 –
p2 ln53 contends that the K1 is more likely to fail and his invention will detect
the more likely to fail switch which is better than a control that does not
monitor its switches. In contrast the present invention if either K1 or K2 is
found to be closed during an idle period of the device, the control will not close

20   either. From the embodiment: *With S4 closed, the control scans the state of K1,
K2 and K4. To verify the states of K1 and K2 the control reads the signal on
RA0 through R2. Before a cycle is started the ac node sensed by RA0 is
floating if K1 and K2 are open as expected. R1 pulls RA0 high when the ac
node is floating (Figure 3B). If K2 alone has shorted the ac node connected to*

25   *RA0 is at Neutral producing the signal in 3C. If K1 is closed the ac node is at
L1 producing the 60hz signal in Figure 3A. The control reads RA0 when RTCC
goes low, if RA0 is high both K1 and K2 are open. If it is low there is a fault
and the control will not close K1 or K2 to start a cycle until repairs are made.*

Bartels attempts to reduce the risk by using a K2 relay similar to the K1

30   i.e. one capable of switching the load, further reducing the likelihood that K2
fails. This is not the generally accepted practice. Generally only the switching

relay, K1 is capable of switching the load, the other relays in the circuit just carry the load current. Using a less capable relay, for K2 lowers cost while slightly increasing the chances of K2 failure. Therefore it is even more desirable to be able to detect a failure of K2 to be open without closing K1

5   when a relay not designed to switch the load is used for K2.

Further the approach in Bartels requires his switching relay, K1 to open and close twice as often as the present approach. Bartels correctly states that the most common time for a switch to fail is when it is changing state p1 ln52 - ln54. The more a relay is switched, the shorter the life expectancy. Yet Bartels

10   requires his switching relay to close twice to start a transducer (one closing for the test and a second closing to actually start the transducer). Therefore I do not believe the present approach is obvious in light of Bartels. It certainly wasn't to Bartels one presumably one skilled in the art.

Claims 41 and 42 state that the test for the switches is done without

15   turning either switch on which in something Bartels does not do, even though he admits it is desirable to know that each switch is open before closing the first of a pair of switches. In the present embodiment the control verifies that both K1 and K2 are open without closing either one.

Bartels also uses separate sensors (23 and 26) for each relay. Claim 43

20   states that more than one switch in a single circuit be tested by one sensor. You cited Wallaert in the past, Wallaert does show 4 circuits containing two switches in Figure 1. Wallaert makes no attempt to verify that the top most switch 1 is open. While he may determine the states of more than one switch the switches are not in the same circuit. Unlike the present invention, and similar to Bartels,

25   Wallaert cannot determine if any switch 19 is open without closing the other switch in the circuit, switch 1.

Claim 44 concerns paused periods in transducer operation. During a paused period, one switch stops the transducer while the rest of the switches in the circuit remain closed. In Bartels any time the transducer is stopped the

30   control attempts to open all the switches. Bartels tests as K1 is opened, but opens K2 regardless of the results. While the Bartels method is the most direct,

it shortens the life of said switches by needlessly opening and closing all the switching each time the transducer is stopped. When a transducer need only be paused for a short time (lid opening or motor direction change, etc), the present invention will only open another switch if the transducer current has not stopped as intended. From the embodiment: *The control also checks the state of the switching relay K1 each time the motor is stopped. K1 is opened by the control to stop the motor as required during a cycle or by the opening of the lid switch S2 when the motor is rotating in the spin direction. The control reads the state of S2 on RB1 through R3. In spin R4 pulls RB1 high if S2 is open. The state of K1 is verified each time either the control or S2 attempts to open it. If K1 has opened the signal on RA1 is pulled low through K2 by the connection of the motor to Neutral. If RA0 is not low when RTCC goes high the control opens K2 stopping the motor until repairs can be made.*

In claims 45 and 47 a paused period is started by an override (like the lid switch or pressure switch). Bartels does not address overrides, but applying his method of stopping transducer operation would lead to problems. If Bartels opens the second switch after the override opens the first, the possibility exists that the override will already have reclosed the first switch resulting in the second switch, Bartels safety switch, being subject to arcing as it would then be opening the circuit. And of course the Bartels approach leads to needless extra switching shortening switch life.

In claim 46 the override and the control share a switch in the transducer circuit. Both the override and the control can open the switch. This is the preferred method as fewer switches are employed. And because the control can open the shared switch, it can be tested prior to any of the switches in the transducer circuit being closed.

Claim 48 concerns multi-throw switches such as K4 in the embodiment. The position of K4 at the start of the motor determines which way the motor will spin and which circuit will be energized (same transducer but different circuit). If K4 is not in its intended state the motor will not turn in the proper

direction, which can be hazardous. Bartels does not address multi-throw switches, his switches are either open or closed always forming the same circuit.

Claims 49 uses the sensing mean to determine the state of an external switch, which is an override whose intended state is unknown to the control.
Bartels does not deal with any switches that the control does not know the intended state because his sensing method relies on the control be able to set all switch states.

Claim 50 adds a second transducer circuit, which is similarly scanned prior to the start of a cycle.
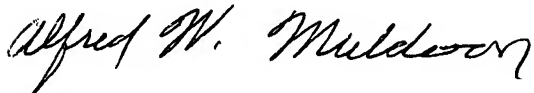
In claim 51 one sensor is used to scan both the circuit containing a first transducer and the circuit containing a second transducer. In, Wallaert each switch 1 (other than the top switch 1) scan one switch 19 (fig 1) or two switch 19s(fig 5). However even in Figure 5 each switch 19 scanned by one sensor (a switch 1) is connected to the same transducer. Claims 51 makes clear that one sensor must scan one circuit with a first transducer and a second circuit containing a second transducer, not two circuits containing the same transducer. Further switches 19 are not used to energize transducers, the top switch 1 is turned on to read switches 19 for a period so short that the transducers will not be energized or deenergized according to Wallaert. While it might appear switches 19 would energize the transducers Wallaert is very clear that the voltage to switches 19 is on for such a short time the operation of the transducers is not affected. Switches 19 are not transducer switches in Wallaert rather they are used to switch inputs to the control. Switches 19 are only connected to supply voltage for less than a millisecond. Just long enough for their state to be read and too short a time to energize the transducers.

In summary present invention prevents transducers for being mistakenly turned on as long as there is at least one functioning switch in the circuit. The control will not close the last good switch for testing or any time the transducer should not be on. The same can not be said of prior art. Further the present approach significantly reduces the number of times switches are switched

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compared to prior attempts to verify functionality, thereby prolonging the life of the switches.

In view of the amendments and these remarks, the applicant respectfully submits that the present application is in condition for allowance. A notice to

5   that effect is earnestly and respectfully requested.

Respectfully submitted,

Alfred W. Muldoon

10   ALFRED W. MULDOON

Included newly presented claims for application 10/082,454 and a
summary of the arguments made during the telephonic interview. Also included
is this signed statement. I hereby declare that said substitute specification
contains no new matter.

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_Alfred W. Muldoon_____

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There are a total of 14 pages including this statement.

Alfred Wade Muldoon
2603 Willa Dr
15   Saint Joseph, MI 49085
App. No. 10/082,454
Tel 269-983-2352
Fax 269-429-0192